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Description

Laboratory Notebook Preparation and a Graphing Exercise.

Instructions

The Data Analysis portion of the lab is generally completed as part of the lab period. This is not *always* a requirement, but it is a VERY GOOD habit to get into. For your first lab report we will require you to complete the Reporting Sheet/Data Analysis before leaving lab.

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1. Question Details Lab1_Q1 [3221229]

The first part of the analysis is to generate a graph (using Excel) with all four sets of data on the same graph. Before you begin to make your graph, consider which data set is the ***dependent variable*** (the data on the y-axis) and which data set is the ***independent variable*** (the data on the x-axis). The ***independent variable*** is the variable that you had control over.

What is the ***independent variable***? (hint: the one you had control over)

- ○ volume
- ○ mass

What is the ***dependent variable***? (hint: the one you measured)

- ○ volume
- ○ mass

2. Question Details Lab1_Q2a [3221230]

Now go create the Excel graph with all four sets of data on the **same graph** (scatter plot, points only - no connecting line). Once you have your data **points** displayed on the graph, add 4 regression lines (called Trendlines in Excel) and include on the graph the "fit-equations" and "R-squared" value (statistics) for each data set. Also include axes labels, a legend, a title, and your name.

Answer the following **after** your graph is completed.

Before you print this graph, lets check a few things:
a) Did you plot all 4 sets of data on the same graph?

- ○ no
- ○ yes

b) Did you add axes labels (mass and volume) **with units**, to your graph?

- ○ yes
- ○ no

c) Is your name on the graph...in a "text box" (**not** hand written)?

- ○ no
- ○ yes

d) Did you include the trendlines **with** the fit-equation and R-squared value for each data set clearly shown on the graph? Note: it is sometimes difficult to know which fit-equation/R-squared is associated with each data set. If you "click" on the equation, you can add to this "text box" a descriptive name for the data set.

- ○ yes
- ○ no

Print your graph and present it to your TA or lab instructor. Any required edits will be pointed out; if necessary, please make the corrections and again present it to your TA or lab instructor.

3. Question Details Lab1_Q2b [3221501]

Please enter below the equations for the "best-fit" regression lines.
Example input:
y=2.32x+0.093 (beaker/RO)
y=1.21x+0.343 (graduated cylinder/RO)
y=3.8x+0.123 (unknown_1)
y=3.6x+0.238 (unknown_2)

Please make sure you print out the graph and turn it in at the end of the lab period.

4. Question Details Lab1_Q3 [3221279]

Let's discuss the first set of data collected:
Data Set 1: mass data collected using a volume measured via a beaker.

So why did we do this experiment? (hint: all below are correct!)

- [ ] you got to work/collaborate with a lab partner.
- [ ] you now know how to determine the "density" of a liquid.
- [ ] you now know how to graph data using Excel.
- [ ] you now know how to "tare" a top-loading balance.
- [ ] you now know how to collect and enter data into your lab notebook.

5. Question Details Lab1_Q4 [3221318]

Let's expand on the answer *"you now know how to determine the density of a liquid."* As you recall from the previous question about **independent (x-axis, volume) and dependent (y-axis, mass)** variables, we graph data in a way so the the slope (rise/run) of the line that represents this data will have units that are of "interest" to the experiment at hand. In this case the units for the slope are grams(y-axis)/mL(x-axis), which is equal to the density!

Enter the density (ie. slope) for data set 1 (RO/beaker):
[ ] g/mL (Note: if your slope is not between 0.6 and 1.5 you did something wrong; see you instructor)

Using the density input above, calculate the mass of 34.01 mL RO water. [ ] grams
...and calculate the mass of 48.36 mL RO water. [ ] grams

6. Question Details Lab1_Q5 [3221319]

Okay, so why did we redo this experiment using the *graduated cylinder* (data set 2)? Answer: it turns out that beakers are not very **precise** when measuring volumes. When you need to measure volumes in the chemistry lab, we generally use a graduated cylinder. Let's redo the calcuations in the previous problem using the more **precise** data set 2.

Enter the density (ie. slope) for data set 2:
[ ] g/mL

Using the density input above, calculate the mass of 32.72 mL RO water. [ ] grams
...and calculate the mass of 39.50 mL RO water. [ ] grams

7. Question Details Lab1_Q6 [3221420]

Okay, so why did we redo this experiment **a third time**? Answer: this was NOT RO water, but an unknown solution with an unknown density. Hence, we can use this experimental procedure to experimentally determine the density of an unknown. As you can see, the slope, ie. density, of this solution is greater than the RO water. *(Note: we are of course using the graduated cylinder to carryout this experiment in order to be precise in our measurements)* Let's redo the calculations using data set 3.

Enter the density (ie. slope) for data set 3:
[ ] g/mL

Using the density input above, calculate the mass of 32.23 mL of unknown solution. [ ] grams
...and calculate the mass of 44.41 mL of unknown solution. [ ] grams

In some related circumstances, you may know the mass and hence can calculate the volume;
Using the density input above, calculate the volume of 20.23 grams of unknown solution. [ ] mL
...and calculate the volume of 25.33 grams of unknown solution. [ ] mL

...and by the way, you do not need to do any calculations with data set 4 (the data you got from a labmate); this was only done to show you that all unknowns are not the same.

8. Question Details Lab1_Q7 [3221503]

Before leaving the lab, you must turn in your carbon-copies (CC) of your lab work as was documented in your lab notebook. These CC must be **identical** to the written documentation permanently secured in your lab notebook. This means that you are NOT to "hand-write" on the CC; if you forgot to write your name, date, lab partner, etc. prior to tearing out the CC, then put the CC page back into your notebook and then make additions. Additional points will be added to this assignment once the CC are evaluated. Do you understand?
[ ] (type: yes/no)

Assignment Details